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REGIONAL TRADE AGREEMENTS: EFFECTS OF THE ANDEAN AND MERCOSUR PACTS ON THE VENEZUELAN SOYBEAN TRADE AND U.S. EXPORTS

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ABSTRACT: Since the mid-1990s, the two regional trade agreements in South America, the southern Mercosur Pact (among Brazil, Argentina, Paraguay and Uruguay), and the northern Andean Pact (among Venezuela, Colombia, Ecuador, Bolivia, and Peru) noticeably affected certain trade patterns between the two pacts' members and with the United States for various reasons discussed herein. The effect of trade diversion owing to the Andean Pact with its common external tariff and price band system against non-Andean products was examined for soybean and soybean meal imports into Venezuela historically an important market for U.S. products. As well, the recent combining of Mercosur and Andean nations into a single regional trade agreement is likely to further adversely affect U.S. soy product sales to Venezuela. In 2003/04, the United States and Mercosur members of Brazil, Argentina, and Paraguay accounted for 94 percent of the $30 billion of world soybean and meal exports, but supplied little to Venezuela. A partial equilibrium, deterministic, and Armington-type model of the Venezuelan market for soybeans and meal was formulated by combining tariffs and the Andean price band variable levy into a single price wedge. Model results suggest that a combined Mercosur and Andean customs union under either a high or a low world soybean product price scenario would noticeably benefit Mercosur suppliers at the expense of the United States as well as adversely affect domestic Venezuelan producers (soybean processors) and fellow Andean member Bolivia.

Key words: Venezuela, soybeans, soybean meal, trade diversion, Mercosur, Andean Pact, U.S. exports, Armington-type import model, price bands, regional trade agreements

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Regional Trade Agreements in the Americas

Regional trade agreements (RTAs) have become increasingly important in the world as a means of trade expansion as negotiations under the Doha round of the multilateral World Trade Organization have languished.[1] The effects of regional trade agreements (or RTAs) can be quite powerful in changing trade patterns of certain products; RTAs can shift trade away from the lower cost suppliers of a product outside the trade pact to higher cost suppliers within it.[2] Such trade diversion occurs mainly for products that have high tariffs imposed on non-member countries that are competitive suppliers to world markets. RTAs that include the United States have often benefitted U.S. agricultural exports. For example, U.S. agricultural exports to Canada and Mexico under the NAFTA have grown far faster than such exports to the rest of the world.[3]

However, RTAs that exclude the United States can work to the disadvantage of U.S. exporters that are otherwise competitive in world markets. The EU, for example has the largest number of RTAs and preferential trading arrangements of any country or region, affecting 42 least developed countries and 77 former colonies of EU countries.[4] Within the Americas, two RTAs exclude the United States-- the ***Andean Pact***, which consists of Venezuela, Colombia, Ecuador, Bolivia, and Peru, and the Common Market of the South (***Mercosur)***, which includes Argentina, Brazil, Paraguay, and Uruguay.[5] Trade among the member countries of the Andean Pact is free of duty.[6] The Mercosur is an RTA with a common external tariff. All of these countries are members of the Latin-American Integration Association (ALADI) whose goal is to eventually set up a common market among the 12 member countries.[7] As part of the ALADI framework, agreements providing certain tariff preferences already exist among the ALADI countries. Additionally, negotiations between the Mercosur and Andean Pact countries recently concluded in October 2004 with the signing of a general free trade agreement, to be implemented over 15 years, between these two groups of countries.[8]

The effects of RTA's are difficult to chart accurately because of the diversity of tariffs and non-tariff measures applied. However, for primary or agricultural commodities that are traded widely world-wide, and for which there exist a number of competitive suppliers and multiple markets, it is possible to isolate the likely effects of an RTA.

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[1] WTO negotiations under the Doha Round began in 2001, and are scheduled to conclude in 2005, but may very well last longer. Mary Burfisher and Steven Zahniser, ERS, USDA, "Multilateralism and Regionalism: Dual Strategies for Trade Reform," *Amber Waves*, September 2003, p. 1, *www.ers.usda.gov/amerberwaves*.

[2] Burfisher and Zahniser, "Multilateralism and Regionalism."

[3] Between 1993-2000, U.S. agricultural exports to Mexico and Canada grew by 59 percent, while such exports to the rest of the world grew by 10 percent; U.S. agricultural imports from Mexico and Canada grew by 86 percent, and agricultural imports from the rest of the world by 42 percent. Steve Zahniser and John Link, ERS, USDA, *Effects of North American Free Trade Agreement on Agriculture and the Rural Economy,* July 2002, p. ii., Electronic Outlook Report, Agriculture and Trade Reports, www.ers.usda.gov/publications/so/view.asp?f=-*international/wrs-bb/2002*.

[4] Gene Hasha, *European Trade Arrangements in Fruits and Vegetables*, July 2004, Electronic Outlook Report, *http://www.ers.usda.gov/publications/VGS/Jul04/vgs30301*.

[5] Bolvia, Chile, and Peru are associate members.

[6] U.S. Department of State, FY 2001 Commercial Guide, Venezuela, p. 26.

[7] In addition to the 5 Mercosur and 4 Andean Pact countries, ALADI members include Mexico, Cuba, and Chile.

[8] USDA, FAS, *Brazil Trade Policy, Monitoring the Mercosur and Andean Group Agreement, 2004*. GAIN Report No. BR4627, Oct. 25, 2004.

The purpose of this paper is to analyze some of the likely impacts of the Andean RTA and of the RTA between the Mercosur and the Andean Pact countries. We focus on the impacts of these two agreements on U.S. exports of soybeans and soybean meal to the Andean Pact countries, and, in particular Venezuela, previously a large U.S. market for such products. Throughout, volumes of trade in soybeans and soybean meal are denoted as a composite "soybeans and meal" product.[9] Trade data suggest that the formation of the Andean Pact may have resulted in trade diversion of U.S. and Mercosur soybean exports to Venezuela in favor of Bolivia, an Andean Pact member. This paper will analyze how an FTA between the Mercosur and Andean countries, which will eventually provide duty-free access to the Venezuelan market for exports from Brazil and Argentina, may further affect trade flows in the soybean sector. More specifically, the paper:

(i) describes the Venezuelan tariff treatment and elements of the Andean Pact and the upcoming Mercosur/Andean RTA which are relevant to Venezuelan imports of soybeans and meal,

(ii) reviews Venezuela's patterns of soybean and meal imports before and after the Andean Pact to examine how the Pact affected U.S. exports of soybeans and meal to Venezuela, and

(iii) uses counterfactual economic modeling simulations to estimate likely effects on Venezuela's imports of soybean and meal from the United States and other competing South American supplies when Mercosur and Andean Pact countries form a unified South-America-wide RTA

U.S. and South American Trade in Soybeans and Meal

World trade in soybeans and soybean meal grew rapidly during the past two decades; in 2003/04, world exports of soybeans and meal totaled $30 billion, according to data of the U.S. Department of Agriculture and *Oil World*.[10] Argentina, Brazil, Paraguay, and the United States in marketing year 2002/04 accounted for 96 percent of the volume of world soybean exports, and 85 percent of world soybean meal exports.

In the Americas, the United States, Brazil, Argentina, Paraguay, and Bolivia are the leading producers and exporters of soybeans and meal. The South American soybean producers have sharply expanded their production and exports, a result of doubling the area planted to soybeans and near tripling of production.[11] Bolivia, a much smaller producer than the soybean giants of Brazil, Argentina, and the

[9] Throughout this report, volumes of trade in soybeans and meal are combined into a composite, "soybeans and meal" product where soybean quantities are converted to a meal basis through multiplication by a 0.79 conversion factor and added to soy meal quantities.

[10] For marketing year 2003/04, beginning Oct. 1, source: export volume from USDA, *World Agricultural Supply and Demand Estimates,* Aug. 12, 2004, p. 26-27; and *Oil World*, Oct. 22, 2004, p. 547.The value estimates reflect average world export prices (at Rotterdam) of $316 per mt for soybeans, and $273 per mt for soybean meal (Brazilian).

[11] Combined Argentine and Brazilian harvested acreage rose from 14.5 million hectares in 1992/93 to 31.0 million hectares in 2003/04, and production rose from 30 mmt to 88 mmt. Source: USDA, FAS, *World Markets and Trade*, Mar. 1995, and Oct. 2004, tables 12-14.

United States, has become a significant exporter of soybeans and meal, with its production and exports having tripled during the past ten years.[12]

Most of the other countries in the Americas are net importers and substantial markets for soybeans and meal, and among the largest is Venezuela. Venezuela, one of the world's leading petroleum producers, has historically been among the top 30 markets for U.S. merchandise exports. In 2001, Venezuela imported annually nearly $6 billion of U.S. merchandise, and a total $17 billion from all countries.[13] Venezuelan imports from the United States then fell sharply to $4.1 billion in 2002, and then to $2.6 billion in 2003.[14] The political and economic crisis within Venzuela resulting in a general strike and a petroleum output decline in 2003 adversely affected its trade.[15]

The United States has been a major supplier of soybeans and soybean meal to the world and to Venezuela. South American suppliers of Brazil, Argentina, Paraguay, and Bolivia compete as well with the United States for soybean and soybean meal exports to Venezuela. Over the past 15 years, U.S. exports of soybeans and soybean meal (herein after termed "soybeans and meal") worldwide have grown from about $5 billion in 1989 to about $9 billion in 2003, according to data of the U.S. Department of Commerce (figure 1). For the first half of the period (1989-97), U.S. exports of soybeans and meal to Venezuela followed a similar trend, rising irregularly from $100 million from 1989 to a peak in 1997 of nearly $200 million. Thereafter, U.S. exports to Venezuela dropped to $40 million by 2003. On a volume basis, reported Venezuelan imports of soybeans and meal during 1994-2002 (the latest year for which data are available) rose even as U.S. exports fell (figure 2).

About three-quarters of these U.S. exports to Venezuela consisted of soybean meal and one-quarter of soybeans over the past 15 years, according to data of the U.S. Department of Commerce. Worldwide, the reverse is true: U.S. soybean exports represent about three-quarters of the total and soybean meal, one quarter. Venezuela grows no soybeans, and has limited soybean processing capacity, with high costs of production.[16] Venezuela had four oilseed processors (crushers) in 1999, and only one by 2002.[17] Venezuela produces about one-quarter of its soybean meal consumption from imported soybeans, and three-quarters is imported, but the share of meal imported has steadily risen, driven in part by the high costs of domestic soybean processing.[18]

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[12] Production rose from 0.4 million mts in 1992/93 to 1.2 million mts in 2003/04, and soybean meal exports from 0.15 million mt (mmt) to 0.35 mmt, respectively. In 2003, Bolivia exported 350,000 mt of soybean meal and 200,000 mt of soybeans, mostly to Venezuela, Colombia and Peru. USDA, FAS, *Bolivia Agricultural Situation Annual 2004,* GAIN Report No. BL4001, Feb. 6, 2004, p. 3. And USDA, FAS, *Bolivia's Oilseed Annual Report,* GAIN Report No. BL2001, Feb. 5, 1992, p. 18.

[13] U.S. Department of State, *FY 2003 Country Commercial Guide, Venezuela*, July 2002, pp. 1-3.

[14] Data compiled from official statistics of the U.S. Department of Commerce.

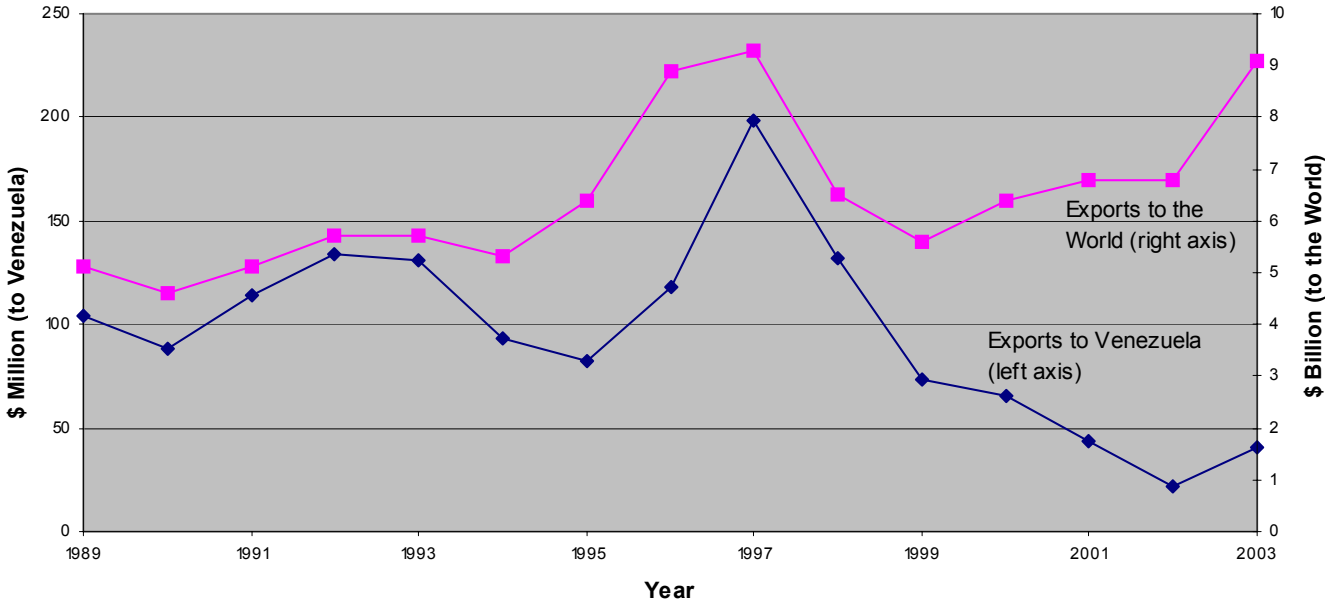
[15] See USTR, *NTE Report 2004*, pp. 487-488.

[16] U.S. Department of State, *FY 2001 Country Commercial Guide, Venezuela*, July 2000, pp. 25-26.

[17] USDA, FAS, *Venezuela to Continue Strong Oilseed Imports,* GAIN Report No. VE8001, Mar.18, 1998, p.8; and *Venezuela Oilseeds and Products Annual 2002,* GAIN Report No. VE2005, Mar.15, 2002, p. 3.

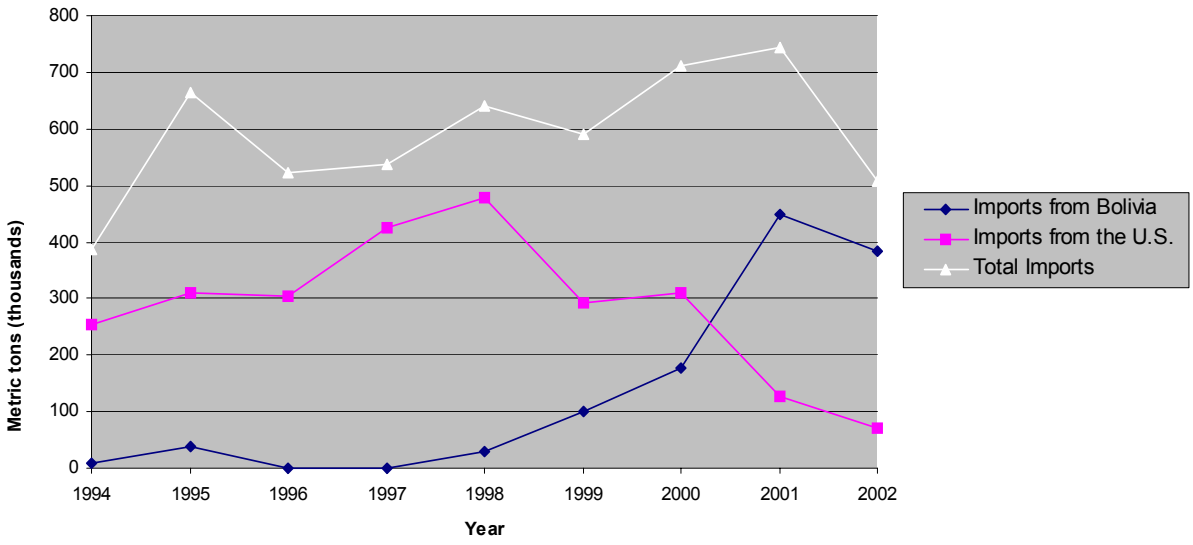
[18] U.S. Department of State, *FY 2001 Commercial Guide, Venezuela*, p. 26.

Figure 1
U.S. soybean and soybean meal exports (in soybean meal equivalents) to the World and to Venezuela, 1989-2003



Source: Compiled from official statistics of the U.S. Department of Commerce.

Figure 2
Venezuela soybean and soybean and meal imports (in soybean meal equivalents), 1994-2002



Source: Compiled from official statistics of the U.N.

Trade Agreements and Venezuelan Tariff Treatment of Soybean and Meal Imports

The Andean Pact and Venezuela

The Andean Pact is a customs union with most trade free among its four members, and with a mostly common external tariff.[19] Since February 1995, Venezuela has been a member of the Andean Pact, along with Colombia, Ecuador, Bolivia and Peru, and as such, products traded are free of duty within the five countries.[20] With duty-free trade, Venezuelan imports from other Andean Pact countries–mostly Colombia–have more than doubled from $490 million in 1994 to $1,277 million in 2002, according to data of the U.N. Venezuelan imports from Colombia rose respectively by $562 million to $964 million, accounting for most of the higher imports from other Andean Pact members. According to UN data, total commodity imports from Bolivia rose from $4 million to $164 million during 1994-2002, and soybean and meal imports from Bolivia rose by $89 million, and accounted for most of this increase.

The duty free treatment for goods traded among the Andean Pact countries encouraged trade substantially among these adjacent countries that straddle the rugged Andes Mountains and the vast Amazon River basin in northern South America (map, figure 3). Colombia, being the largest Andean member nation in population and size of its economy, and geographically the center of the Pact countries, benefitted the most with regards to increased exports. Land-locked Bolivia, the most remotely situated Pact member, benefitted the least as transportation costs limited its access to other members until the late 1990s.

With regard to imports entering from countries outside the Andean Pact, Venezuela applies a Common External Tariff (CET) and requires import licenses and sanitary and phyto-sanitary import certifications for non-Andean soybean imports.[21] The CET is a four-tiered tariff system (5, 10, 15 and 20 percent, depending on the product imported), and has been in effect since February 1, 1995.[22] In 2002, Venezuela applied an NTR (Normal Trade Relations) duty of 15 percent to its imports of soybeans and meal from non-Andean countries.[23]

In conjunction with the CET, Andean Pact members use the Andean price band system as a price stability mechanism for certain commodities, including soybeans.[24] The price band is based on a floor price, a ceiling price, and reference price that represents the import price.[25] If the reference price is lower

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[19] Free trade is in place for all countries except Peru which has some limited exceptions; common external tariffs differ mainly on certain agricultural products. Juan Jose Taccone and Uziel Nogueira, editors, Institute for the Integration of Latin America and the Caribbean (INTAL), Inter-American Development Bank, *Andean Report 1. vol. 1, 2002*, pp. I-ii, and 19.

[20] U.S. Department of State, *FY 2001 Commercial Guide, Venezuela*, p. 26.

[21] USDA, FAS, *Venezuela Exporter Guide Annual 2003*, Caracas, GAIN Report No. VE3010, Dec. 1, 2003. USDA, FAS, *Venezuela Oilseeds and Products Annual 2004*, GAIN Report No. VE4005, Apr. 15, 2004. USDA, FAS, *Venezuela Oilseeds and Products: Venezuela's Oilseed Imports Down, But U.S. Market Share Improves 2003*, Caracas, GAIN Report No. VE3012, Oct. 16, 2003.

[22] Andean Community website *http://www.comunidadandina.org/endex.htm.*

[23] Data from the Free Trade of the Americas (FTAA) Hemispheric Database, retrieved Aug. 16, 2004, from *http://198.186.239.122/chooser.asp?Idioma=Ing.*

[24] USDA, FAS, *Venezuela Oilseeds and Products Annual 2004*; and USTR, *NTE Report 2004*, p. 487.

[25] However the reference price is roughly indicative of market prices, created from certain market averages and price indicators. The reference price is adjusted every two weeks while floor and ceiling prices are adjusted every April. Office of the U.S. Trade Representative (USTR), "*Venezuela," Foreign Trade Barriers Report 2004 (NTE)*, Mar. 30, 2004, p. 487, available at *http://www.ustr.gov*.

Figure 3
Map of South America

Source: CIA The World Factbook *http:/www cia.gov.cia/publications/factbook/reference_maps/central_america.html*

than the floor price, a variable surcharge is applied to the import along with the CET, which can render a very high effective tariff. If the reference price is above the ceiling price, no price band duty will be applied.[26] Generally, an import surcharge has been the more likely outcome.

In 1996, the total effective average duty was the 15 percent NTR duty, plus the price band duty of 10 percent for a total duty of 25 percent ad valorem (AVE).[27] The price band was then adjusted every two weeks, but in general the representative tariffs presented below were collected during 1997-2004. In 1997, higher world prices led to a zero duty for the price band and a total applied duty of 15 percent.[28] In August 1999, the effective tariff was 59 percent (15 percent tariff plus 44 percent price band) on soybeans and meal.[29] In 2004, the much higher world prices for soybeans lowered the total duty (including the price band) on U.S. soybeans and meal to 15 percent.[30] The 2004 Venezuelan tariff scheme is summarized in table 1.

Table 1
Venezuela: Duty treatment of soybeans, soybean meal, and soybean oil, 2004

Commodity	Intra-Andean community Imports	U.S. and third country Imports[1]	Tariff Preferences[2]			
			Paraguay	Uruguay	Argentina	Brazil
Soybeans	no duty	15%+/-DAV	15%+/-	15%+/-DAV	40%	40%
Soybean meal	no duty	15%+/-DAV	75%	15%+/-	35%	35%
Soybean oil	no duty	15%+/-DAV	95%	70%	60%	50%

[1] DAV is a variable tariff resulting from Andean Community Price Band System.
[2] Preferential tariff rate is the listed percentage of the third-Country or WTO rate.

Source: USDA, FAS, *Venezuela Oilseeds and Products Annual 2004*, GAIN Report No. VE4005, April 15, 2004, p.7.

In November 1999, Venezuela established tariff rate quotas for oilseeds and products, with an import licensing regime, and with the ultimate aim of supporting the purchase of domestic oilseed and grain crops.[31] The initial in-quota tariff was 40 percent, and the above-quota tariff was the combined CET and price band. In 2001, owing to the low levels of domestic oilseed production and soybean crushing, and the need for a much higher volume of imported soybean meal, Venezuela rebated ("exonerated ") the in-quota 40-percent duty collected to soybean meal importers (who are feed mill operators) in exchange for their purchase of Venezuelan corn and sorghum crops.[32] In 2002, the in-quota tariff for soybeans and soybean meal remained at 40 percent, and the above-quota tariff was 48 percent (combined price band and CET).[33] In 2003-04, Venezuela's duty treatment became less transparent by having restricted the issuance of import licenses for the quotas on soybean meal, and by having discontinued publishing information on license requests or license issuance.[34]

[26] USDA, FAS, *Venezuela Adopts Andean Price Bands*, GAIN Report No. VE5014, June 20, 1996.
[27] USDA, FAS, *Price Band Impact on U.S. Oilseed/Product Exports*, GAIN Report No. VE5016, June 26, 1995, table 9.
[28] USDA, FAS, *Oilseeds and Products Annual Report 1997*, GAIN Report No. VE7008, Mar. 15, 1997, p. 5.
[29] USDA, FAS, *Venezuela Oilseeds and Products: Tariff Schedule for Soybean Complex 1999*, GAIN Report No. VE9037, Aug. 27, 1999.
[30] USDA, FAS, *Venezuela Oilseeds and Products Annual 2004*, p. 7.
[31] USDA, FAS, *Oilseeds and Products Import Licensing Requirements for the Oilseed Complex, 2000*, GAIN Report No. VE0015, Mar. 31, 2000, p. 2.
[32] USDA, FAS, *Venezuela Oilseeds and Products Import Tax Exoneration for Soybean Meal 2001*, GAIN Report No. VE1007, Feb. 12, 2001, p. 2; and *Venezuela Oilseeds and Products Annual 2001*, GAIN Report No. VE1011, Apr. 11, 2001, p. 7.
[33] USDA, FAS, *Oilseeds and Products Annual Report 2002*, GAIN Report No. VE2005, Mar. 15, 2002, p. 5.
[34] USTR, *NTE Report 2004*, p. 487.

The Mercosur RTA and Venezuela

The Mercosur is a customs union with common external tariffs. The members are Argentina, Brazil, Paraguay, and Uruguay. Bolivia, Chile, and Peru participate in the Mercosur free trade area, but not in the system of common external tariffs.[35] The Mercosur is the largest RTA in the Americas after NAFTA, and its members began phasing out tariffs against each other's products in 1991, and established common external tariffs in 1995.[36]

Members of the Latin American Integration Association (ALADI), including the Mercosur countries (Brazil, Bolivia, Argentina, and Paraguay), have historically had certain preferential lower tariffs and favorable foreign exchange procedures.[37]Access to foreign exchange gave an advantage to ALADI exporters over U.S. exporters with respect to soybean and meal exports to Venezuela. Venezuelan importers did not need to request prior permission for foreign exchange for trade with ALADI members.[38] During 1996 to 2001, with the loosening of exchange controls, the ALADI currency advantage largely disappeared.[39] However, with the economic and political crisis in 2002-03, Venezuela restored exchange controls requiring delays of over sixty days for importers to access foreign currency.[40] This foreign exchange restraint restored advantages to ALADI exporters, and stimulated imports of soybean oil from other ALADI countries in 2003-04.[41]

The current tariff preferences for Venezuela's imports of soybeans, soybean meal, and soybean oil from Paraguay, Uruguay, Argentina and Brazil are shown in table 1. The preferences shown are listed percentages off the third-country or WTO rate.

Tariff preferences for Argentina and Brazil currently range from 35 to 60 percent. A new RTA between the Andean Pact and Mercosur countries has been signed. Under this new agreement, duties on products such as soybeans and meal immediately went to zero, whereas duties on soybean oil are to be phased out over 7 years.[42] Even with this exchange advantage and lower preferential rates (table 1), Venezuelan imports from Brazil, Argentina, and Paraguay have fallen during 1998-2002, perhaps outweighed by the CET duty.

Analysis of Venezuelan Soybean Trade Data: Effects of the Andean Pact

Trade data suggest that tariff preferences provided to Andean Pact members may have resulted in trade diversion of U.S. and Mercosur soybean exports to Venezuela in favor of Bolivia, an Andean Pact member. Tables 2 and 3 provide data on Venezuelan soybean and meal imports from leading

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[35] USITC, *The Year In Trade 2003*, USITC publication 3700, July 2004, p. 5-26, *www.usitc.gov/http://itc--central.usitc.gov/intranet/test/intranet.htm*.

[36] Terri Raney and Julieta Urgaz-Peredea, USDA, ERS, "Chile Moves Ahead with Regional Trade Agreements, *International Agriculture and Trade Reports: NAFTA Situation and Outlook Series*, September 1996, p. 27.

[37] ALADI formed in 1980. U.S. Department of State *American Embassy Montevideo*, "ALADI–The Latin American Integration Association, Oct. 4, 2004, telegram No. 191828Z.

[38] USDA, FAS, *Venezuela Oilseeds and Products Annual Report 1996*, GAIN Report No. VE6006, Mar. 21, 1996; and *Venezuela Oilseeds and Products Annual 2004*.

[39] In 1996, the Ministry of Finance of Venezuela returned foreign exchange responsibility to the Central Bank of Venezuela, ending exchange controls until the political and economic crisis of 2002. U.S. Department of State, *Venezuela Commercial Guide, FY 2003*, p. 3.

[40] USTR, *2004 NTE Report*, p. 488.

[41] USDA, FAS, *Venezuela Oilseeds and Products Annual 2004*, p. 7.

[42] USDA, FAS, *Venezuela Oilseeds and Products Annual 2004*, p. 7.

Table 2
Venezuela: Soybeans and soybean meal, imports by source, 1994-2002

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002
	1,000 dollars								
Argentina	126	6,379	17,581	10,235	4,014	1,063	2,084	5,683	7,180
Bolivia	3,227	12,610	0	0	8,888	24,035	52,394	126,923	91,954
Brazil	11,687	2,474	6,301	4,080	2,262	7	17,048	13,701	97
Paraguay	12,431	64,415	32,347	4,777	17,495	24,945	14,621	6,526	747
United States	64,338	84,472	99,385	155,535	124,143	54,932	71,260	30,427	18,058
All other	6,266	3,467	7,140	16,183	5,511	17,545	23,982	12,498	3,593
World	98,075	173,817	162,754	190,810	162,313	122,527	181,389	195,758	121,629

Source: Compiled from data of the United Nations Statistical office.

Table 3
Venezuela: Soybeans and soybean meal, imports by source, 1994-2002

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002
	1,000 metric tons, soybean meal equivalents								
Argentina	522	16,510	47,186	32,445	13,024	4,428	8,142	25,971	31,207
Bolivia	9,834	38,689	0	0	29,424	99,117	176,381	449,986	385,059
Brazil	48,338	11,400	24,822	127,876	10,375	13	68,001	55,305	159
Paraguay	53,141	271,801	125,375	15,276	79,978	116,298	63,722	30,597	4,000
United States	253,223	310,189	302,750	425,449	477,175	276,544	308,572	125,962	71,396
All other	22,405	14,145	22,988	65,160	32,096	93,614	84,891	89,647	15,644
World	387,463	662,734	523,121	535,886	642,072	590,014	709,709	777,468	507,465

Note.–The reported soybeans, imports were multiplied by a factor of 0.79, and then added to reported soybean meal imports.

Source: Compiled from data of the United Nations Statistical office.

suppliers, as compiled by the United Nations (U.N.) database.[43] For the purpose of this study, 1995 may be considered the year of the Andean Pact implementation as this is when the CET was enacted.

Venezuela's overall market for soybeans and meal grew annually by 8.6 percent during 1994-2001, rising from about 400 thousand metric tons (tmt) to 777 tmt (table 3). The drop in imports in 2002 was connected to the political and economic crisis that resulted in a sharply devalued currency, exchange controls, and import licensing described earlier on grain and oilseeds in Venezuela.[44]

Owing to business ties, geographical proximity, and competitive ocean freight rates,[45] the United States had dominated the Venezuelan import market for soybeans and meal. For example, U.S. product accounted for 66 percent of Venezuela's 1994 imports of $98 million, and for 82 percent of 1997 imports

[43] U.N. Trade Database. The volume data for combined soybeans and soybean meal are shown on a meal basis, with bean imports converted to meal basis by multiplying by a factor of 0.79.

[44] U.S. Department of State, *FY 2003 Venezuela Commercial Guide,* pp. 1- 3. Import licensing is described in USDA, FAS, *Venezuela Grain and Feed Annual 2002,* GAIN Report No. VE2007, Mar. 27, 2002; and *Venezuela Oilseeds and Products Annual 2002.*

[45] For example in mid-2004, the ocean freight rate for bulk grain and oilseeds moving to Venezuela from U.S. Gulf ports (where most U.S. exports transit) was $29 per metric ton, only a dollar above the rate for grain moving to east coast Mexican ports, and slightly lower than the $32 a ton rate for U.S. grain moving to the EU (Antwerp ports). Source: International Grains Council, *Grain Market Report*, June 30, 2004, table 30.

of $198 million (table 2). Thereafter, U.S. soybean and meal exports fell as sales from Bolivia increased to Venezuela.[46]

During 1998-2002, reported imports of U.S. soybeans and meal into Venezuela of U.S. soybeans and meal fell 85 percent from 477 tmt to 71 tmt (table 3). Meanwhile, Venezuelan imports of Bolivian soybeans and meal rose markedly from 29 tmt to 385 tmt, more than a ten-fold gain. Imports from Brazil, Argentina and Paraguay, the Mercosur countries, averaged about 200 tmt annually during 1996-97, but then began a steady decline to 35 tmt in 2002. USDA forecasts indicate a strong increase in 2003-04 in South American soybean sales to Venezuela, particularly from Bolivia.

Bolivian soybean and meal exports to Venezuela were erratic until 1997 in part because of the rudimentary transportation system between Bolivia and Venezuela,[47] and a lack of Bolivian confidence in Venezuelan payment procedures.[48] Since the latter 1990s, the development of a soybean marketing system through northern Brazil and the Amazon River basin considerably lowered freight costs of Bolivian products moving to Venezuela. Bolivian soybean areas are adjacent to the largest Brazilian producing state of Mato Gross (figure 3).[49] Soybeans and meal move by river barge on the Madeira River to ocean-vessel ports on the Amazon River at Itacoatira or by truck across the Brazilian State of Amazones to the port at Santarem.[50] As the barge and highway system through northern Brazil are improved, the cost of exporting Bolivian soybeans and meal to Venezuela falls.

UN data suggest that since the beginning of significant trade in 1994, Bolivian exports to Venezuela shifted to the processed and higher valued soybean meal from unprocessed soybeans. In 1994, Bolivia exported only soybeans to Venezuela; by 2002, Bolivia exported no soybeans and only soybean meal, according to data of the UN. Nearly all Bolivian exports of soybeans and meal go to the other Andean Pact countries, Venezuela, Colombia, Ecuador, Bolivia, and Peru.[51]

Effect of a Mercosur-Andean RTA on U.S. Exports of Soybeans and Meal to Venezuela

Given that Venezuela's tariffs on soybeans and soybean meal are to go to zero under the Mercosur-Andean RTA, an important question is how these preferential tariff changes will likely affect U.S. exports of these products to Venezuela. In this section, we specify an graphical framework and a partial equilibrium simulation model to provide a range of possible simulated effects of implementing a Mercosur-Andean RTA. The economic framework and analysis is based on the assumption that Venezuela's current tariff protection for soybeans and soybean meal on third-country imports is a variable levy which reverts to the Andean CET (15 percent ad valorem) when world prices are high and the variable component is zero. Under a Mercosur-Andean RTA, Venezuela's imports of soybeans and soybean meal from Brazil and Argentina will be allowed to enter duty-free, whereas U.S. imports will be subject to the CET plus the variable component as determined by world prices.

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[46] USDA, FAS, *Venezuela Exporter Guide Annual 2002*.

[47] USDA, FAS, *Venezuela Oilseeds and Products, Price Band Impact*, July 13, 1995.

[48] USDA, FAS, *Venezuela's Oilseed Imports Down,* Oct. 16, 2003.

[49] The State of Mato Grosso supplied 28 percent of the entire Brazilian soybean crop in 2002/03; USDA, FAS, *Brazil Oilseeds and Products Annual 2003*, GAIN Report No. BR3003, Mar. 10, 2003, p. 29.

[50] The Amazon River port at Itacoatiara is about 160 miles east of Manaus, Brazil, and serves ocean-going vessels up to 50,000 metric tons; the port of Santarem, is also several hundred miles east of Manaus, with deep port capacity. See USDA, FAS, *Brazil Oilseeds and Products Annual 2004*, GAIN Report No. BR4611, May 13, 2004, pp. 39-40; and Randall Schnepf, Erik Dohlman, and Christine Bolling, ERS, USDA, *Agriculture in Brazil and Argentina*, ERS report No. WRS013, Dec. 2001, pp. 47-49.

[51] USDA, FAS, GAIN Report No. BL4001, Feb. 6, 2004, p. 3; *Oil World*, Oct. 22, 2004, p. 544.

Economic Framework (Graphical)

This section provides a graphical analysis of the impact on third-country (U.S.) exports of soybeans and meal to Venezuela following the removal of Venezuela's variable levy on imports from Mercosur countries, particularly from Brazil and Argentina. Figure 4 provides the analysis' graphics. A number of assumptions are made here to simplify the graphic presentation without changing the qualitative results of the analysis.

1. First, Venezuela is assumed to consider Mercosur and non-Mercosur (primarily U.S.) consignments of soybeans and meal as reasonably high substitutes.

2. Second, Venezuela's modest production is excluded from the analysis and assumed zero.

3. Third, the initial situation is assumed to be where the Andean floor price exceeds world price, thus a variable tariff confronts Mercosur exporters to Venezuela.

4. Fourth, the variable Venezualan tariff on Mercosur products is assumed zero, rendering the world price as the Venezuelan import price from Brazil and Argentina after the implementation of an RTA.

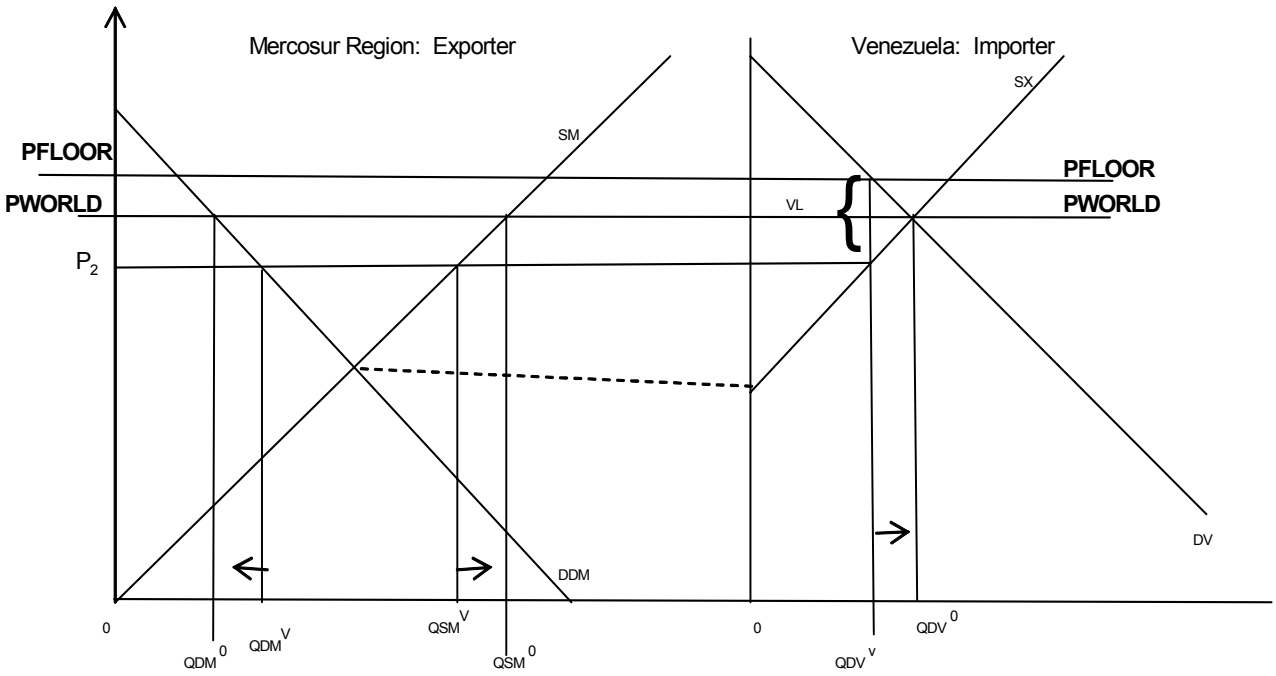
Initially, when Venezuela imposes a variable levy of VL on Mercosur: Mercosur exports ($0QSM^v - 0QDM^v$) to Venezuela, while domestically consuming $0QDM^v$ and producing $0QSM^v$, as P2 clears the Mercosur market. Under the variable levy, the world price would be P2, below the world price (PWORLD) without the variable levy, as the market must absorb the difference between the greater trade without the variable levy, denoted as $0QDV^o$ and the trade with the variable levy, denoted $0QDV^v$.

Removal of the variable levy of VL (assuming a zero tariff) would raise Venezuelan demand and imports from $0QDV^v$ to $0QDV^o$, and the market-clearing price in Venezuela would fall to PWORLD. The relevant Mercosur price would rise from P2 to PWORLD, which in turn would raise Mercosur production by ($0QSM^o - 0QSM^v$); decrease domestic Mercosur consumption by $0QDM^v - 0QDM^o$); and render the increased quantity for export to Venezuela. Under the assumption of high levels of Venezuelan substitutability among Mercosur and non-Mercosur (primarily U.S.) soybeans and meal, much of the increased Mercosur exports to Venezuela, ($0QDV^0 - 0QDV^v$), would likely be lost U.S. sales in the market.

Partial Equilibrium Model Analysis

The goal is to specify a partial equilibrium simulation model of the Venezuelan import market for soybeans and meal, and then estimate (counterfactually) the effects on Venezuela's multi-sourced array of purchases from the decrease in Venezuela's import protection levels on Mercosur-sourced soybean and meal as the Mercosur and Andean regions are merged into an RTA. Throughout this analysis, the traded quantities of "soybeans and meal" are the meal-equivalent of soy meal and soybeans, where soybeans are converted to a meal-equivalent by multiplying bean volumes by 0.79 (see table 2). Results should reflect a rise in Mercosur sales of soybeans and meal at the expense of U.S. and other suppliers' exports to this market, as shown and/or implied in the graphical analysis above. We concentrate on two scenarios that have recently occurred: (1) where the world price exceeds the reference price and the tariff equals the CET, and (2) where the world price in Venezuela is below the domestic reference price and the variable levy is positive.

Figure 4
Effects on Venezuela's imports of Mercosur soybeans and meal of removing the Andean variable levy: The case of the floor price exceeding world price



Source: Compiled by the Commission.

For the simulations, we applied the multi-market, multi-region, and Armington-type partial equilibrium model documented in Babula, Fry, Hall, and Jabara (BFHJ).[52] Summarized in the technical appendix, the BFHJ model was modified to capture Venezuela's demand for its domestically produced product and of imports from three other sources: the United States, Mercosur region, (non-Venezuelan) Andean region, and a residual rest of the world or ROW.

Each of the two sets of simulation results were compared with results from the model under a baseline of market conditions before the Mercosur-Andean RTA, taken as average 2000-2001 conditions.[53] For each of the four source-differentiated quantities of soybeans and meal imported into Venezuela, an ad valorem equivalent or AVE was calculated for the combined protection of Venezuela's import tariff and the variable levy: the relatively smaller AVE level with a zero variable levy component during 2003/04 when the world price exceeded the Andean reference price and a relatively larger AVE with a positive variable levy component reported during 1998/99 through 2001/02 when world price fell

[52] Ronald Babula, J. Fry, H. Keith Hall, and Cathy Jabara, "A Comparative Static Analysis of European Union Tariff and Support Policies for Canned Pears," *Journal of International Food and Agribusiness Marketing*, vol. 12 (2001), no. 2/3, pp. 29-58.

[53] We chose this baseline because average 2000-2001 conditions were deemed the most recent that best approximated conditions before the Mercosur-Andean RTA.

below the Andean reference price.[54] Methods by which these AVE values were calculated are outlined in the technical appendix's material which follows documentation of the BFHJ model. Under the two scenarios, the shock to the model entails a decrease in the relevant Venezuelan AVE on Mercosur-sourced soybeans and meal to zero. Table 4 provides these AVE values for the estimated AVE's levied on the variously-sourced soybeans and meal imported into Venezuela.

Table 4
Estimated ad valorem equivalents of tariffs and variable levies on Venezuela-bound imports

Source of soybeans and meal	Scenario 1 (high world price, 2003/04 situation): zero variable levy (world price above reference price)	Scenario 2 (low world price, 1998/99 to 2001/02 situation): positive variable levy (world price below reference price)
	Percent	
Mercosur region	11.1	46.1
Andean region	0.0	0.0
United States	15.0	48.0
Other	15.0	48.0

Source: Calculations of the authors. See technical appendix, table A-2 and related discussion.

In addition to the price wedges provided in table 4, it is evident from the technical appendix's documentation of the BFHJ model that the model requires an array of assumptions concerning baseline data on Venezuela's production and trade in soybean and meal, various price elasticities of demand and supply for soybeans and meal, elasticities of substitution, among others. The technical appendix following this paper, particularly table A-3, provides such parameters.[55] The alternative scenarios under which a Mercosur/Andean RTA are modeled are as follows:

> Scenario 1, High world soybean prices (the 2003/04 situation) and a zero variable levy component when the reference price was below the world price: the AVE of 11.1 percent imposed on Venezuela's imports of Mercosur-sourced product zero (table 4) is decreased to zero.
>
> Scenario 2, Low world soybean prices (during 1998/99 to 2001/02 situation) and a positive variable levy with the reference price above the world price: the AVE of 46.1 percent (table 4) imposed on Venezuela's imports of Mercosur-sourced product is decreased to zero.

The other non-Mercosur AVEs remain unchanged under both scenarios. A number of explanatory comments follow concerning table 4's ad valorem equivalents (AVEs) of Venezuelan tariffs and variable levies placed on imports of soybeans and meal from the Mercosur region: 11.1 percent and 46.1 percent. Each is a trade-weighted average of Venezuelan AVE's placed on imports from the four individual Mercosur countries (Argentina, Brazil, Paraguay, and Uruguay). The two sets of individual

[54] World prices for soybeans rose by about 74 percent and for soybean meal by 63 percent from 2001/02, a year with low prices to 2003/04, a year with the highest prices in two decades. World prices for soybeans in 2001/02 averaged $181 per mt for Brazilian and Argentine soybeans, and $174 per mt for U.S. soybeans. In 2003/04, Brazilian/Argentine soybeans averaged $317 per mt, and U.S. soybeans, $303 per mt. Soybean meal prices followed a similar trend with Brazilian/Argentine soybean meal rising from an average $165 per mt in 2001/02 to $269 per mt in 2003/04. USDA, FAS, *Oilseeds: World Markets and Trade*, Sept. 2004, table 20.

[55] Many of these table A-3 parameters are developed and derived in tables A-1 and A-2, and in related appendix discussion.

nation AVEs placed on Venezuelan imports of soybeans and meal are estimated and presented in the technical appendix (table A-1). Each of the two sets of four Mersocur country AVEs were then weighted by its national share of baseline (2000-2001) Venezuelan imports of Mecosur-sourced soybeans and meal, and then summed into a Mercosur-wide AVE price wedge: 11.1 percent for scenario 1 and 46.1 percent for scenario 2. The technical appendix (table A-1 and A-2 and related discussion) fully derives and calculates these two wedges.

In both scenarios, the price wedges include Venezuela's current preferences on soybeans and meal imports from Brazil and Argentina. In both sets of simulation results, Venezuela's duty on U.S. exports of soybeans and meal remain unchanged. Results of both scenarios are in table 5. Generally, one would expect results which qualitatively reflect those of the more simplified graphical analysis using figure 4, and this is what emerged from the simulations.[56] And also in line with intuition and expectations, the degree of the rise in Mercosur sales to Venezuela, the magnitude of price changes, and the degree of the decline in U.S. and other non-Mercosur sales to Venezuela when the Mercosur/Andean RTA is implemented is positively correlated with the size of the eliminated AVE price wedge on Venezuela's Mercosur-sourced imports.

Table 5
Results of eliminating Venezuela's AVE on Mercosur soybeans and meal: Cases of a zero and positive variable levy

Item	Domestic production, Venezuela	Imports of Andean product	Imports of Mercosur product	Imports of U.S. product	Imports of residual ROW product
Baseline scenario: Average 2000-2001 conditions before a Mercosur/Andean customs union					
Baseline Venezuelan imports (mt) . .	223,000	313,184	182,814	217,267	30,324
Scenario 1, A zero variable levy and a high world price: Elimination of 11.1% AVE on Mercosur product					
Venezuelan production/imports (mt) .	215,717	296,163	235,003	205,459	28,676
Percent change from baseline	-3.3	-5.4	+28.5	-5.4	-5.4
Percent change, price in Venezuela	-1.0	-1.0	-7.0	-1.0	-1.0
Scenario 2, A positive variable levy and a low world price: Elimination of 41.6% AVE on Mercosur product					
Venezuelan production/imports (mt) .	193,699	249,095	401,029	172,806	24,119
Percent change from baseline	-13.1	-20.5	+119.4	-20.5	-20.5
Percent change, price in Venezuela	-5.0	-3.0	-21.0	-3.0	-3.0

Source: Results of BFHJ model simulations and calculations by authors.

Notes.—Production of Venezuelan soybean meal is from imported soybeans. Venezuelan imports are the total of soybeans and soybean meal in soybean meal equivalents.

[56] Note that for ease of reader comprehension, assumptions were imposed in order to simplify the graphical analysis from the model analysis. But generally, both the graphical and model analyses generated qualitatively similar results.

Scenario 1: Elimination of Venezuela's 11.1 Percent AVE on Mercosur Soybeans and Meal

In 2003/04, world prices of soybeans and meal were high and generally above the Andean reference prices, which rendered a zero variable tariff component on Venezuela's imports of soybean and meal.[57] The combined tariff and variable protection on Mercosur product imported into Venezuela is lower than under cases when world prices are low and there is positive a variable levy component. The case of high world prices and a zero variable levy component for 2003/04 market conditions were estimated and render a 11.1 AVE imposed by Venezuela on Mercosur-sourced soybeans and meal (see technical appendix). Results of eliminating this 11.1 percent AVE price wedge (scenario 1, table 5) suggest that Mercosur supplier countries would noticeably increase sales at the expense of not only the United States and other non-Mercosur suppliers, but also at the expense of Venezuela soybean and meal producers and producers from fellow Andean member supplier nations, particularly Bolivia. Mercosur suppliers (presumably Argentina and Brazil particularly) would increase Venezuela sales by 28.5 percent to about 235,000 metric tons, at the expense of non-Mercosur export suppliers, whose sales would decline by 5.4 percent.[58]

In particular, U.S. export sales to Venezuela would drop by 5.4 percent, a loss amounting to 12,000 mt. A Mercosur/Andean RTA under this setting would displace domestic Venezuelan production by about 7,300 mt (3.3 percent), and by a far more substantial 17,000 mt (5.4 percent) for fellow Andean pact suppliers, primarily Bolivia. Prices from all sources would fall in Venezuela: from a 7 percent decline in prices for the directly benefitted Mercosur exports, to 1 percent for product from other sources. Venezuelan exports (not shown in table 5) would fall by nearly a percent to about 129,000 mt.

Scenario 2: Elimination of Venezuela's 41.6 Percent AVE on Mercosur Soybeans and Meal

During 1998/99 until 2001/02, world prices of soybeans and meal were low and generally below the Andean reference prices, such that imposed variable levies on Venezuelan imports were positive. Thus, the Andean AVE of the combined tariff and variable levy protection on Mercosur product slated for Venezuela is higher than scenario 1's case. The case of low world prices and zero variable levies estimated for then-prevailing market conditions rendered a 41.6 percent AVE imposed by Venezuela on Mercosur-sourced soybeans and meal (see the technical appendix).

Results of eliminating this 46.1 percent AVE price wedge (scenario 2, table 5) suggest that Mercosur supplier countries would qualitatively mirror the results generated under scenario 1, but results would be more pronounced. Mercosur sales (presumably sourced primarily from Argentina and Brazil) to Venezuela would more than double, and rise 119 percent to 401,000 mt, at the expense of both domestic production and non-Mercosur (including U.S.) export sales. All other foreign export suppliers would lose about a fifth of their business in Venezuela, and this would amount to a decline of about 44,000 mt for the United States. More specifically, the Mercosur/Andean union would adversely affect domestic producers and other fellow Andean pact suppliers (primarily Bolivia): consumption of domestic production would fall 29,000 mt or by 13 percent, Venezuelan exports (not in table 5) would fall 4,500 mt or 3.4 percent, while export sales to Venezuela by other Andean countries (primarily Bolivia)

[57] During 1998/99 to 2001/02, U.S. soybean prices (No. 1, yellow, Central Illinois) averaged $174 per mt; they then rose to $232 per mt in 2002/03, and eventually reached a near-record high $303 per mt in 2003/04. USDA, FAS, *Oilseeds: World Markets and Trade*, September 2004, table 20.

[58] When rounded to the first decimal place, the percent declines in non-Mercosur export sales to Venezuela all seem equal in this and the following scenario, although they are not identically the same.

would fall a substantial 64,000 mt or 5.4 percent. Prices of all sources of product would fall: from a 21 percent decline for the Mercosur product, to a 5 percent decline for domestic product, and to a 3 percent decline for the U.S. and other non-Mercosur suppliers.

Summary and Conclusions

With regard to imports entering from countries outside the Andean Pact, Venezuela applies a Common External Tariff (CET) and requires licenses and sanitary and phytosanitary import certifications for non-Andean soybean imports. In conjunction with the CET, Andean Pact members use a price band system as a price stability mechanism for certain commodities, including soybeans, and in effect, a variable surcharge depending on prevailing world prices relative to the domestic Andean reference price added to the CET.

Under the Andean Pact, the source of Venezuelan soybean and meal imports shifted from lower cost U.S. and Brazilian to otherwise higher cost Andean Pact (primarily Bolivian) product. With the duty-free trade, total commodity imports into Venezuela from Bolivia rose from $4 million to $164 million during 1994-2002, with soybean and meal imports from Bolivia rising by $89 million. The duty-free treatment for goods traded among the Andean Pact countries encouraged substantial trade among these adjacent countries that straddle the rugged Andes Mountains and the vast Amazon River basin in northern South America.

The United States is a major supplier of soybeans and soybean meal to the world and to Venezuela. As well, South American suppliers such as Brazil, Argentina, Paraguay, and Bolivia compete with the United States for soybeans and soybean meal exports to Venezuela. Owing to business ties, geographical proximity, and competitive ocean freight rates, the United States had dominated the Venezuelan import market for soybeans and meal for many decades, accounting for 82 percent of its imports in 1997. U.S. exports of soybeans and meal to Venezuela in 1997 amounted to $200 million, but then dropped to $40 million by 2003 based on (U.S. Department of Commerce data, figure 1). During 1998-2002, imports into Venezuela of U.S. soybean and meal fell 85 percent from 477,000 mt to 71,000 mt (table 3), Bolivian exports of soybeans and meal rose from 29,000 mt to 385,000 mt.

As illustrative exercises, a partial equilibrium, deterministic, and Armington-type model of the Venezuelan market for soybeans and meal was formulated and simulated under two scenarios. Both scenarios summarized the protection levels afforded by Venezuela's import tariffs and the Andean price band variable levy into an ad valorem equivalent or AVE price wedge for Venezuelan imports of soybeans and meal from the Mercosur region, other Andean nations as a region, the United States, and the residual ROW.

Scenario 1 estimated these AVE price wedges under 2003/04 conditions when world prices exceeded Andean reference prices and variable levies on Venezuelan imports were zero. The import price wedge is relatively small as are the market impacts of its removal.

Scenario 2 estimated the AVE price wedges under conditions during 1998/99 to 2001/02 when world prices fell below the Andean reference price and Andean variable levies on imports were positive. This scenario's larger price wedge generates markedly more pronounced market impacts.

Generally, the model results suggest that implementation of a Mercosur/Andean RTA under either scenario would noticeably benefit Mercosur suppliers at the expense of U.S. and other export sales to Venezuela. Also of note, the RTA under either scenario would adversely affect domestic Venezuelan soybean processors and other fellow Andean pact member suppliers (particularly Bolivia). Prices within Venezuela would fall for soybeans and meal from all sources.

Model results estimate that a Mercosur/Andean RTA would elicit declines in U.S. sales to Venezuela ranging from 12,000 mt under high world prices (such as during 2003/04) and a zero Andean

variable levy, to 44,000 mt under conditions (such as during 1998/99 to 2001/02) with low world prices and a positive Andean variable levy.

A Mercosur and Andean customs union would adversely affect Andean suppliers. Sales to Venezuela by other Andean pact members, particularly Bolivia, would fall by nearly 17,000 mt under conditions of low prices and a zero variable levy, and by as much as 64,000 mt under conditions of higher world prices and a positive variable levy. Venezuelan export sales and domestic prices suffer under both scenarios: exports and domestic price both fall by one percent under scenario 1 while exports fall by about three percent and domestic price by as much as five percent under scenario 2.

Technical Modeling Appendix: Model Spefication and Assumptions of Parameters and Baseline Data

This technical modeling appendix is comprised of four sections. The first presents the model. The second provides the nation-specific ad valorem equivalents of the combined protection levels from tariffs and the Andean price band variable levy placed on Venezuela-bound soybeans and soy meal from the four individual Mercosur countries, the United States, and the rest of the world. Table A-1 provides these parameters for both scenarios as defined in this paper's text. The third section develops and calculates the Mercosur region AVE price wedges for a composite soybean and meal product. These Mercosur region AVEs are trade-weighted averages of the protection levels placed on a soybean and meal product or average "composite" product under scenarios 1 and 2. Basically, trade weighted averages of the Mercosur wedges in table A-1 are calculated in table A-2. And fourth, there is a section providing assumed data and parameters needed to service the model under the two assumed scenarios. Table A-3 provides a summary of these assumptions.

The Partial Equilibrium, Armington Model Framework[59]

For our simulations, we developed a multi-market, multi-region partial equilibrium model. Under fairly common Armington-type assumptions, differentiated products from different regions are assumed to compete in the Venezuelan domestic market for soybeans and meal.[60] In addition to some domestic production, Venezuela imports soybeans and meal from the Mercosur region, other Andean Pact countries, the United States, and a residual rest of the world or ROW. In addition to competing against imports, Venezuelan producers also purchase intermediate inputs from domestic markets. The output is then sold in both Venezuela and a single aggregate ROW region. The multi-market, multi-region nature of the model allows us to simultaneously model the effect of three kinds types of Venezuelan support policies:

1) import tariffs on competing soybeans and meal and other policy levers which can be summarized into a product price wedge;

2) any subsidies (or subsidy equivalents) applied directly to domestic soybeans and meal production, which are not herein considered; and

3) subsidies (or subsidy equivalents) applied to the production of intermediate inputs into soybeans and meal, which are also not herein considered.

Multi-market, multi-region partial equilibrium models, with varying specifications, have been applied to agricultural products many times. Major agricultural products are often marketed globally and government support programs often impact agricultural products both directly and indirectly through

[59] The modeling documentation closely follows that provided by Ronald A. Babula, John Fry, H. Keith Hall, Cathy L. Jabara, "A Comparative Static Analysis of European Union Tariff and Support Policies for Canned Pears," *Journal of International Food and Agribusiness Marketing*, vol. 12, no. 2/3 (2001), pp. 29-58.

[60] The original citation for models of this type is P. Armington, "A Theory of Demand for Products Distinguished by Place of Production," *International Monetary Fund Staff Papers*, vol. 16 (1969), pp. 159-79. In Armington-type models, final products are grouped by country/region of production and assumed to be imperfectly substitutable in consumption with each other in a single domestic market.

related product markets. For a presentation of a simple version of such a model and a discussion of previous uses of multi-market, multi-region models see Roningen (1997).[61]

Specifically, the model reflects and/or assumes the following:

1. Two factor markets for a soybeans and meal composite product are assumed not to be totally fixed in supply, and are assumed as imperfect substitutes in the production of the single final good. Production is assumed to occur under a constant elasticity of substitution (CES) technology.[62] Venezuela is assumed to be a profit maximizer.

2. The single final good, soybeans and meal (as defined in the text), is assumed to compete in the domestic Venezuelan market with imports from the Mercosur region, the rest of the Andean region, the United States, and a residual ROW.

3. Venezuela is a modest exporter of soybeans and meal to an aggregate ROW export market under the assumption that Venezuela-produced product for domestic use and for export are perfect substitutes in production.

Soybeans and Meal Demand

We assume a system of non-linear demand equations where Venezuelan and imported consignments of soybeans and meal compete in the Venezuelan market. Using Armington assumptions, we define composite good, y, as a Constant Elasticity of Substitution (CES) function of Venezuelan soybeans and meal sold domestically, y_d, and all imports, y_m.[63] The prices of the domestically packed and imported products are p_d and p_m, respectively. Demand for the domestic good and the imported goods are therefore (respectively):

$$y_d = \left[\frac{\alpha_d}{p_d} \right]^{\sigma} P^{\sigma-1} y \qquad (1)$$

and

[61] Vernon Roningen, "Multimarket and Multi-Region partial Equilibrium Modeling." In J. Francois and K. Reinert, eds., *Applied Methods for Trade Policy Analysis, A Handbook* (London, UK: Cambridge University Press, 1997), pp. 231-257.

[62] Only the production of Venezuelan soybeans and meal is explicitly modeled. Normally, the factors are generally grouped to match Venezuelan policy instruments affecting the cost of production of soybeans and meal. But since the wedges on the prices of these factors are not changing, and hence not an issue in this study, the pre- and post- shock wedges are equal in all simulated scenarios. Two generic factors with production cost shares adding to 100 percent are assumed and generic, and do not influence the results.

[63] Therefore, we have

$$y = \left[\alpha_d {y_d}^{\rho} + \alpha_m {y_m}^{\rho} \right]^{\frac{1}{\rho}}$$

where ρ is the substitution parameter (ρ=1-1/σ for elasticity of substitution σ).

$$y_m = \left[\frac{\alpha_m}{p_m} \right]^{\sigma} P^{\sigma-1} y \tag{2}$$

where P is the price index for the composite good as follows:[64]

$$P = \left[\alpha_d^{\sigma} p_d^{1-\sigma} + \alpha_m^{\sigma} p_m^{1-\sigma} \right]^{1-1/\rho} . \tag{3}$$

Assuming a constant demand elasticity (CDE) form for aggregate industry demand, industry expenditures may be represented as:

$$y = AP^{\eta+1} \tag{4}$$

where η is the aggregate elasticity of demand for the industry.[65]

We allow two-way trade, so Venezuelan producers are assumed to also export an identical product (that is, goods for the domestic market are perfectly substitutable in production with goods sold domestically) to aggregate export markets with a CDE demand:

$$y_x = \alpha_x p_d^{\eta_x} \tag{5}$$

where η_x is the aggregate elasticity of demand for the domestically produced final goods in export markets.[66]

Import Supply

On the supply side, the import supply function y_m is assumed to have Constant Supply Elasticity (CSE) form so that eliminating the ad valorem import tariff uses:

$$y_m = ks_m p_m^{\varepsilon_m} \tag{6}$$

where ε_m is the elasticity of import supply to the domestic market, and the constant is

[64] The constants in the final goods market are calibrated by scaling the initial quantities ($\bar{y}_d$ and $\bar{y}_m$) so that initial prices are one (including the price index). The constants above are therefore initialized as follows:

$$\alpha_d^{\sigma} = \left(\frac{\bar{y}_d}{\bar{y}} \right) \text{ and } \alpha_m^{\sigma} = \left(\frac{\bar{y}_m}{\bar{y}} \right) .$$

[65] Constant A is calibrated (by the quantity scaling above) as the initial industry expenditures ($\bar{y}$).

[66] Constant α_x is set at the initial value of exports, $\bar{y}_x$ (through the quantity scaling).

$$ks_m = \left(\frac{\bar{y}_m}{1 + t_m} \right)^{\varepsilon_m}$$

where t_m is the Venezuelan ad valorem (equivalent) import tariff.

Intermediate Input Markets

This portion of the model is not engaged or relevant for this analysis, insofar as there are no changes in the price wedges corresponding to the factor set: wedges on both factors are unchanged in all scenarios. The ensuing material is provided for completeness of model documentation.

Total Venezuelan production, y_{vz} is sold in both domestic and export markets

$$y_{vz} = y_d + y_x \tag{7}$$

and is assumed to have CES technology and employ intermediate inputs of two types: variable inputs (x_v), and fixed inputs (x_f). We will use a calibrated share form of the CES function that takes the form:

$$y_{vz} = \bar{y}_{vz} \left[\theta_v \left(\frac{x_v}{\bar{x}_v} \right)^{\mu} + \theta_f \left(\frac{x_f}{\bar{x}_f} \right)^{\mu} \right]^{\frac{1}{\mu}} \tag{8}$$

and where μ is the substitution parameter where $\mu = 1 - 1/\tau$ for elasticity of substitution in production τ, and the r_j are factor prices.[67] Demands for the intermediate products therefore take the form:

$$x_j = \bar{x}_j \frac{y_{vz}}{\bar{y}_{vz}} \left(\frac{c\bar{r}_j}{\bar{c}r_j} \right)^{\tau} \quad for\ j = v, f \tag{9}$$

where v, and f are subscripts denoting variable and fixed factors, respectively, and the unit cost of production scaled to the initial cost of production takes the form:

$$\frac{c}{\bar{c}} = \left[\sum_{j=1}^{m} \theta_j \left(\frac{r_j}{\bar{r}_j} \right)^{1-\tau} \right]^{\frac{1}{1-\tau}}. \tag{10}$$

The zero profit condition is

$$p_d = \frac{c}{1 + sp_{vz}} \tag{11}$$

where sp_{vz} is the ad valorem production subsidy. The factor supply functions are:

[67] Each constant is therefore set at $\theta_j = \dfrac{\bar{r}_j \bar{x}_j}{\bar{r}_v \bar{x}_v + \bar{r}_f \bar{x}_f}$ $for\ j = v, f$.

$$x_j = k_j \left(\frac{r_j}{\bar{r}_j} \right)^{\varepsilon_{sj}} \quad for\ j = v, f \tag{12}$$

where ε_{sj} is the elasticity of supply of the intermediate good j, and

$$k_j = \left(\frac{\bar{x}_j}{1 + s_j} \right)^{\varepsilon_j} \quad for\ j = v, f$$

where s_j is are the ad valorem subsidy on intermediate good j.

Equilibrium

The model is solved by finding factor prices r_v, and r_f and soybeans and meal prices p_d and p_m such that supply equals demand simultaneously in both factor markets and the soybeans and meal markets. This is done by setting equation (12) equal to equation (9),

$$k_j \left(\frac{r_j}{\bar{r}_j} \right)^{\varepsilon_{sj}} = \frac{y_{vz}}{\bar{y}_{vz}} \left(\frac{c\bar{r}_j}{\bar{c}r_j} \right)^{\tau} \quad for\ j = v, f$$

substituting equations (1) and (5) into equation (7) and setting it equal to equation (8),

$$\bar{y}_{vz} \left[\theta_v \left(\frac{x_v}{\bar{x}_v} \right)^{\mu} + \theta_f \left(\frac{x_f}{\bar{x}_f} \right)^{\mu} \right]^{\frac{1}{\mu}} = \left(\frac{\alpha_d}{p_d} \right)^{\sigma} P^{\sigma-1} y + \alpha_x p_d^{\eta_{xx}}$$

and setting equation (6) equal to equation (2)

$$ks_m\, p_m{}^{\varepsilon_m} = \left(\frac{\alpha_m}{p_m} \right)^{\sigma} P^{\sigma-1} y$$

Policies generally enter the model through price wedges. A factor subsidy enters the model as a wedge between the price at which the factor is supplied and the price the producer would pay, without the subsidy. This wedge on factor price may be converted to an output price wedge equivalent through multiplication of the factor price wedge by the factor's share of Venezuela's final product production costs. Output price supports, hereinafter denoted as output subsidies, enter the model as a wedge between supply price at which the producer offers the commodity and the price at which consumers demand the product. An import tariff is reflected as a wedge between domestic and world prices.

Generally, the model employs the "equilibrium displacement" method by combining demand, supply, and equilibrium conditions of the output and factor markets, and then calibrating the system to

approximate conditions of a chosen, observed period -- hereafter the base period.[68] An exogenous shock is imposed on the base run, and the model solves for post-shock values of own-product consumption, prices, implied trade levels, and input prices and quantities.

The chosen partial equilibrium modeling methodology is an effective way to combine economic theory with observed (baseline) conditions to build a framework to approximate actual market conditions. The model is useful in simulating hypothesized market shocks (e.g., specific policy eliminations) to generate "what if" scenarios. That is, the model is able to approximate what would have occurred in the Venezuelan soybean and meal market, under assumed baseline conditions, had the simulated shocks actually occurred.

However, there are three qualifications to using the modeling framework which should also be noted. First, the model compares pre-shock (base run) and post-shock values that arise from an imposed shock, but does not illuminate the dynamics of the how the variables adjust from the old into the new equilibrium. Second, as with all deterministic models, there is uncertainty about the true values of the assumed parameter and elasticity values needed to service the model.[69]

Third, these types of models are most effectively simulated for "small" changes in policy instruments.[70] This is because theory underlying such models generally employs "marginal" analysis, that is "small" changes on the margin, where assumed parameters and elasticities are time-invariant.[71] A large change, perhaps a complete overhaul or even total elimination of a large production aid or price support policy, may induce structural change in all assumed parameters. So caution should be used in interpreting model results from what readers consider to be "large" or regime-changing policy alterations.[72]

Calculation of Nation-Specific Ad Valorem Equivalents of Combined Protection: Venezuela Tariffs and Andean Price Band Variable Levy on Soybeans and Soy Meal, 2002 and 2003

Scenario 1 reflects the 2003/04 situation, when world prices of soybeans and soy meal were higher than the Andean reference (import) price, and when the Andean variable levy under the price band system was zero. Scenario 2 reflects the 1998/99 to 2001/02 situation when world prices of soybeans and soy meal were lower than the Andean reference (import) price, and when the Andean variable levy under the price band system was positive. Table A-1 provides estimates of the ad valorem equivalents or AVEs placed on Venezuela-slated exports of soybeans and soy meal from Mercosur countries, the United States, and other rest of the world countries under scenarios 1 and 2 defined above. This section documents the estimation of these AVE estimates for the two scenarios.

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[68] See Organization for Economic Cooperation and Development (OECD). *A Matrix Approach to Evaluating Policy: Preliminary Findings from PEM Pilot Studies of Crop Policy in the EU, the U.S., Canada, and Mexico* (Paris, France: OECD, 2000), p. 9.

[69] See Organization for Economic Cooperation and Development (OECD). *A Matrix Approach to Evaluating Policy: Preliminary Findings from PEM Pilot Studies of Crop Policy in the EU, the U.S., Canada, and Mexico* (Paris, France: OECD, 2000), pp. 8-9.

[70] Bruce Gardner, *The Economics of Agricultural Policies* (New York: Macmillan, 1987), chapter 4.

[71] Bruce Gardner, *The Economics of Agricultural Policies* (New York: Macmillan, 1987),p. 93; Organization for Economic Cooperation and Development (OECD). *A Matrix Approach to Evaluating Policy: Preliminary Findings from PEM Pilot Studies of Crop Policy in the EU, the U.S., Canada, and Mexico* (Paris, France: OECD, 2000), pp. 9-10.

[72] Bruce Gardner, *The Economics of Agricultural Policies* (New York: Macmillan, 1987), p. 93.

Table A-1
Ad valorem equivalent estimates of combined protection on Venezuela-bound soybeans and soy meal exports of Venezuela's tariff and the Andean variable levy under two scenarios

Item/country	Paraguay	Uruguay	Brazil	Argentina	United States	Rest of world
			Percent			
Scenario 1: High world prices above the Andean reference prices with a zero Andean variable levies						
Soybeans	15.0	15.0	9.0	9.0	15.0	15.0
Soy meal	3.75	15.0	9.75	9.75	15.0	15.0
Scenario 2: Low world prices below the Andean reference prices with a positive Andean variable levies						
Soybeans	48.0	48.0	28.8	28.8	48.0	48.0
Soy meal	12.0	48.0	31.2	31.2	48.0	48.0

The data have been taken from various reports of the Foreign Agricultural Service for the conditions prevailing in 2002 and in 2003/04.[73]

Calculation of Ad Valorem Equivalent of the Protection Levels Placed on Venezuela-Bound Exports of a Mercosur-Sourced Soybean and Meal Composite Product

The purpose of this appendix subsection is to construct an AVE price wedge equivalent to estimate, as a price wedge, the combined protection levels placed on exports of Mercosur consignements of a soybean and meal composite product bound for Venezuela. The Mercosur region price wedges or AVEs are calculated for scenarios 1 and 2 defined above, and are trade-weighted averages of Venezuela-bound soybean and meal exports by the four individual Mercosur regions. The Mercosur AVEs or price wedges are calculated in table A-2 below using the individual country wedges of the four Mercosur country exporters of soybeans and soy meal to Venezuela as presented in table A-1 above.

The final page of this appendix is table A-3. This table summarizes the data and parameters needed to service the model under its various scenarios.

[73] U.S. Department of Agriculture, Foreign Agricultural Service (USDA, FAS). *Venezuela: Oilseeds and Products Annual*, 2004, p. 7. See also USDA, FAS *Venezuela: Oilseeds and Products Annual*, 2002, p. 6.

Table A-2
Calculation of a Mercosur region price wedge for protection placed on Venezuela-bound Mercosur exports of a composite soybean and meal composite product

	C1 Paraguay	C2 Brazil	C3 Argentina	C4 Uruguay	C5 Mercosur region	Algebraic calculations and explanations
RA: 2000 Exports to Venezuela (mt)	63,722	68,001	8,142	67,213	207,078	
RB: 2001 Exports to Venezuela (mt)	30,597	55,305	25,971	46,677	158,550	
RC: Baseline: 2000-01 average exports to Venezuela (mt)	47,159.5	61,653	17,056.5	56,945	182,814	
RD: Mercosur member trade weights for baseline (proportions)	0.258	0.337	0.093	0.311	n/r	RD is a row of trade weights and are obtained for columns C1 through C5 as follows: RL/(182,814).
RE: Scenario 1, AVE, soybeans exports to Venezuela (percent)	15.0	9.0	9.0	15.0	n/r	
RF: Scenario 1, AVE, soy meal exports to Venezuela (percent)	3.75	9.75	9.75	15.0	n/r	
RG: Scenario 1, AVE, soybeans and meal composite (percent)	9.375	9.375	9.375	15.0	n/r	RG is a row of average AVEs for soybeans and soy meal. For columns C1 through C4, RG calculated as (RE+RF)/2.
RH: Scenario 1, trade- weighted nation-specific AVEs (percent)	2.419	3.159	0.872	4.665	n/r	RH for columns C1 through C4 are calculated as follows: RD*RG.
RI: Mercosur region trade weighted AVE, scenario 1, for composite soybean and meal product (percent)	n/r	n/r	n/r	n/r	11.1	C5 value on RI is only relevant calculation and is a sum of columns C1 through C5 along RH.
RJ: Scenario 2, AVE, soybeans exports to Venezuela (percent)	48.0	48.0	28.8	48.0	n/r	
RK: Scenario 2, AVE, soy meal exports to Venezuela (percent)	12.0	48.0	31.2	48.0	n/r	
RL: Scenario 2, AVE, soybeans and meal composite (percent)	30.0	48.0	30.0	48.0	n/r	RL is a row of average Aves for soybeans and soy meal. For columns C1 through C4, RL calculated as (RJ+RK)/2.
RM: Scenario 2, trade-weighted nation-specific AVEs (percent)	7.74	16.176	2.79	14.928	n/r	RM for columns C1 through C4 are calculated as RD*RL
RI: Mercosur region trade weighted AVE, scenario 2, for composite soybean and meal product (percent)	n/r	n/r	n/r	n/r	41.6	C5 value on RI is only relevant calculation and is a sum of columns C1 through C5 along RM.

Notes.—The term "n/r" means not relevant. Note that the algebraic calculation column utilizes the row and column labels next to each relevant item. Each labeled row (denoted =RA, RB, etc) and each labeled column (C1, C2, etc) are identified above.

Sources: Sources and calculations for soybean export AVEs in rows RE and RJ and soy meal export AVEs in rows RF and RK are provided above in table A-2 and related discussion. All trade data in the table are taken from the data base provided by the United Nations Statistical Office. The trade weights in row RD are author-calculated.

Table A-3
Venezuela soybean and meal model: Base data, assumed parameters for two scenarios, and data sources

Item assumed/calculated	Value entered into model	Source and explanation
Apparent Venezuelan consumption of domestic product, baseline	223,000 mt	Average of Venezuela's 1999/2000 production of 295,000 mt and 2000/01 production of 150,000 mt. FAS.
Venezuela AVE price "tariff" wedge on imports of non-Venezuela Andean product	0.0	Andean product enters Venezuela at zero tariff. Assumed to be Bolivian product.
Venezuela AVE price "tariff" wedge on imports on Mercosur product	scenario 1: 11.1% scenario 2: 41.6%	See tables A-1 and A-2 and discussion.
Venezuela AVE price "tariff" wedge on imports of U.S. product	scenario 1: 15.0% scenario 2: 48.0%	See table A-1 and discussion.
Venezuela AVE price "tariff" wedge on imports from residual ROW	scenario 1: 15% scenario 2: 48%	See table A-1 and discussion.
Venezuelan baseline imports of other Andean product	313,184 mt	Assumed as imports of Bolivian product. Average of 2000-2001 data from U.N. Statistical Office database.
Venezuelan baseline imports of Mercosur region product	182,814 mt	2000-2001 average data for 4 Mercosur countries. U.N. Statistical Office database.
Venezuelan baseline imports of U.S. product	217,267 mt	2000-2001 average data for U.S. exports. U.S. Department of Commerce, official trade statistics.
Venezuelan baseline exports to world	130,000 mt	2000-2001 average data. U.N. Statistical Office database.
Venezuelan elasticity of substitution among alternatively sourced product	5.0	Assumed as "high." Value of 3.0 would be medium.
Venezuelan aggregate price elasticity of product demand	-0.6	Estimate price of Venezuelan demand for soymeal by W. Gardiner, V. Roningen, K. Liu, "Elasticities in the Trade Liberalization Database." Economic Research Service, May, 1989, p. 51.
Price elasticity of world demand for Venezuelan product exports	-0.3	Assumed at low levels.
Price elasticities of supply to Venezuelan market: for other Andean region, Mercosur region, United States, and residual ROW	7.0 for each region.	Assumed at "moderate to high" levels following R. Babula, J. Fry, H.K. Hall, and C. Jabara, "A Comparative Static Analysis of European Union Tariff and Support Policies for Canned Pears," *Journal of International Food and Agribus. Mktg.*, vol 13, no. 2/3, 2001, p. 55.

Notes.—"Product" refers to a soybean and meal composite. Baseline data are averages of 1999/2000 and 2000/2001 market years and/or 2000 and 2001 calendar years, depending on data availability. FAS denotes U.S. Department of Agriculture, Foreign Agricultural Service. Scenario 1 is the case of world soy product prices being higher than the Andean reference prices, a zero Andean variable levy, and where the AVE on Venezuelan imports of Mercosur product falls from 11.1% to zero. Scenario 2 is the case of world soy product prices being lower than the Andean reference prices, a positive Andean variable levy, and where the AVE on Venezuelan imports of Mercosur product falls from 41.6% to zero.